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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,018	05/19/2006	Johannes Bos	127898	7546
25944 7590 11/17/2008 OLIFF & BERRIDGE, PLC P.O. BOX 320850 ALEXANDRIA, VA 22320-4850				
EXAMINER				
LSTVOYB, GREGORY				
ART UNIT		PAPER NUMBER		
1796				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/580,018

**Applicant(s)**

BOS, JOHANNES

**Examiner**

GREGORY LISTVOYB

**Art Unit**

1796

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 September 2008.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.  
4a) Of the above claim(s) 6-9 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-5 and 10 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date \_\_\_\_\_  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/26/2008 has been entered.

### ***Election/Restrictions***

Newly submitted claims 6-9 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the above claims drawn to the method of dissolving a crumbed copolymer. This method is not related to a method of obtaining aromatic polyamide in form of crumb.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 6-9 withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5 and 10 rejected under 35 U.S.C. 103(a) as being unpatentable over Vollbracht et al (US 4308374) herein in view of Vollbracht Chernykh et al (RU 2017866) herein Chernykh or Jung et al (US 5646234) herein Jung (both cited in the previous Office Action)

Vollbracht teaches a method for obtaining a an aromatic polyamide containing para-phenylene terephthalamide in the form of a crumb, by polymerizing para-phenylenediamine and terephthaloyl dichloride in a mixture of N-methyl pyrrolidone and containing calcium chloride

Vollbracht teaches is a aromatic polyamide in the crumb form, which has a relative viscosity of at least 4 and the crumb is formed directly by the copolymerizing (see Example 1).

Vollbracht teaches that his polyamide can be used for fiber formation.

Vollbracht does not teach 5(6)-amino-2-(p-aminophenyl)benzimidazole and ratios between the monomers, which are suitable for crumb formation.

Chernykh discloses a method for obtaining a composition for fiber formation comprising an aromatic polyamide containing para- phenylene terephthalamide and 2-

(p-phenylene)benzimidazole terephthalamide units by copolymerizing: i) a= 10-80 mole % of para-phenylenediamine; ii) b=10-80 mole % of 5(6)-amino-2-(p-aminophenyl)benzimidazole; and iii) 100 mole% of terephthaloyl dichloride (see Example 1).

Note that in the Example 1 Chernykh uses Cl-para-phenylenediamine, whereas Claim 1 claims para-phenylenediamine. However, Chernykh teaches that the above compounds are equivalent (see Page 7, line 15).

Also, Chernykh teaches that DMAA and NMP as well as LiCl or CaCl<sub>2</sub> can be equally used (see Page 3, line 25).

in a mixture of N-methyl pyrrolidone and containing 2.8-4.8% wt.% of calcium chloride or lithium chloride (see Table 2, column 2), a + b is 100 mole% and i), ii), and iii) together comprise 1-20 wt.% of the mixture (see Example 1), Based on the above data the result of b x c multiplication can be less than 215.

Intrinsic viscosity of the polymer above is between 5.9 and 10.9 dl/g (see Table 2).

Jung discloses method of obtaining an aramid by polycondensation of 100 mol% terephthaloyl chloride, 40 mol% p-phenylenediamine and 60 mol% 5(6)-amino-2-(p-aminophenyl)-benzimidazole in N-methylpyrrolidone, wherein a+b=100 mol% and the relative viscosity is 4,3 (see example 8).

Jung discloses solubility-promoting additives such as calcium dichloride in amounts of between 0,2 and 10 wt.%, preferably between 0,5 and 5 wt.%, can be added to the polycondensation mixture (see column 3, lines 19-35 and 62-67).

Chernykh or Jung do not disclose a crumb obtained directly by copolymerization, since their processes are intended to directly process a solution into article immediately after synthesis.

5(6)-amino-2-(p-aminophenyl)benzimidazole is a common monomer for fiber-forming polymer. Typically this compound used when high temperature resistance or broad temperature range of application is needed. Also benzimidazole known for their fire resistance and good mechanical properties (especially tensile strength and modulus).

Relations between monomer content,  $\text{CaCl}_2$  and other technological parameters in order to obtain a crumb can be adjusted by an artisan with routine experimentation approach.

Therefore, it would have been obvious to a person of ordinary skills in the art to apply 5(6)-amino-2-(p-aminophenyl)benzimidazole comonomer in Vollbracht's fiber-

froming polyamide, since it increases temperature application range, enhances mechanical properties and possess excellent fire resistivity.

Claims 2-5 rejected under 35 U.S.C. 103(a) as being unpatentable over Chernykh et al (RU 2017866) herein Chernykh or Jung et al (US 5646234) herein Jung (both cited in the previous Office Action) in combination with Vollbracht et al (US 4308374) herein Vollbracht or Encyclopedia of Pol. Sci and Tech (Polyamides, vol 3, p. 565-567) herein Encyclopedia and the Applicant's admission of the Prior Art in the Specification ((both cited in the previous Office Action).

Chernykh discloses a method for obtaining a composition comprising an aromatic polyamide containing para- phenylene terephthalamide and 2-(p-

phenylene)benzimidazole terephthalamide units by copolymerizing: i) a= 10-80 mole % of para-phenylenediamine; ii) b=10-80 mole % of 5(6)-amino-2-(p-aminophenyl)benzimidazole; and iii) 100 mole% of terephthaloyl dichloride (see Example 1).

Note that in the Example 1 Chernykh uses Cl-para-phenylenediamine, whereas Claim 1 claims para-phenylenediamine. However, Chernykh teaches that the above compounds are equivalent (see Page 7, line 15).

Also, Chernykh teaches that DMAA and NMP as well as LiCl or CaCl<sub>2</sub> can be equally used (see Page 3, line 25).

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Intrinsic viscosity of the polymer above is between 5.9 and 10.9 dl/g (see Table 2).

Jung discloses method of obtaining an aramid by polycondensation of 100 mol% terephthaloyl chloride, 40 mol% p-phenylenediamine and 60 mol% 5(6)-amino-2-(p-aminophenyl)-benzimidazole in N-methylpyrrolidone, wherein  $a+b=100$  mol% and the relative viscosity is 4,3 (see example 8).

Jung discloses solubility-promoting additives such as calcium dichloride in amounts of between 0,2 and 10 wt.%, preferably between 0,5 and 5 wt.%, can be added to the polycondensation mixture (see column 3, lines 19-35 and 62-67).

Chernykh or Jung do not disclose a crumb obtained directly by copolymerization, since their processes are intended to directly process a solution into article immediately after synthesis.



Regarding Claims 4 and 5, Encyclopedia discloses a process of obtaining Poly(p-phenylene terephthalamide) in of N-methyl pyrrolidone at the presence of Calcium Chloride. Encyclopedia teaches a process for making a purified aromatic polyamide, which comprises coagulating and washing the crumb in water, followed by drying step (see pages 565 and 567).

Vollbracht teaches a method for obtaining a an aromatic polyamide containing para-phenylene terephthalamide in the form of a crumb, by polymerizing para-phenylenediamine and terephthaloyl dichloride in a mixture of N-methyl pyrrolidone and containing calcium chloride

Vollbracht teaches is a aromatic polyamide in the crumb form, which has a relative viscosity of at least 4 and the crumb is formed directly by the copolymerizing (see Example 1).

Vollbracht teaches that his polyamide can be used for fiber formation.

Chernykh or Jung does not teach the polymer precipitation step, since synthesis of polymer and its processing locates in one facility. However, more commonly those two processes are separated. In this case it is economically efficient to transport and store dried polymer instead of its diluted solution in N-methyl pyrrolidone.

Therefore, it would have been obvious to a person of ordinary skills in the art to precipitate Chernykh's or Jung's polymer using Encyclopedia's and Vollbracht's technology in order to expand applicability of the polyamide.

Chernykh or Jung and Encyclopedia does not disclose the crumb is defined as non-sticky particles at least 95% of which having an average diameter of 0.7-15 mm.

However, according to Applicant's discussion of the Prior Art in the Specification, such crumbs are known from the process of preparing of fully aromatic polyamides based on e.g. PPD and TDC, which products are known under the trade names Twaron® (Teijin Twaron) and Kevlar (DuPont). After polymerization in NMP/CaCl<sub>2</sub> a crumb is obtained which can be easily coagulated, washed, and dried, and the product obtained can be dissolved in sulfuric acid and shaped into a desired form, like fibers or films.

The crumbs of the above particles are very process-friendly, in particular, in a filtration step. The efficiency of the above step can be impaired with fines or sticky gels. Polymer precipitation aiming the crumbs with particular particle size can be achieved with well known technological approaches (rate of precipitant adding, temperature, stirring, etc).

Therefore, it would have been obvious to a person of ordinary skills in the art to obtain crumb with optimum particle size (i.e. 0.7-15 mm) in order to achieve efficient filtration process.

It is noted that there is no showing of unexpected results, associated with particular particle size range in the Specification.

***Response to Arguments***

Applicant's arguments with respect to claim 1-5, 10 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY LISTVOYB whose telephone number is (571)272-6105. The examiner can normally be reached on 10am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rabon Sergent/  
Primary Examiner, Art Unit 1796

GL